A Hydromorphological Terrestrial Water Classification Algorithm for SWOT

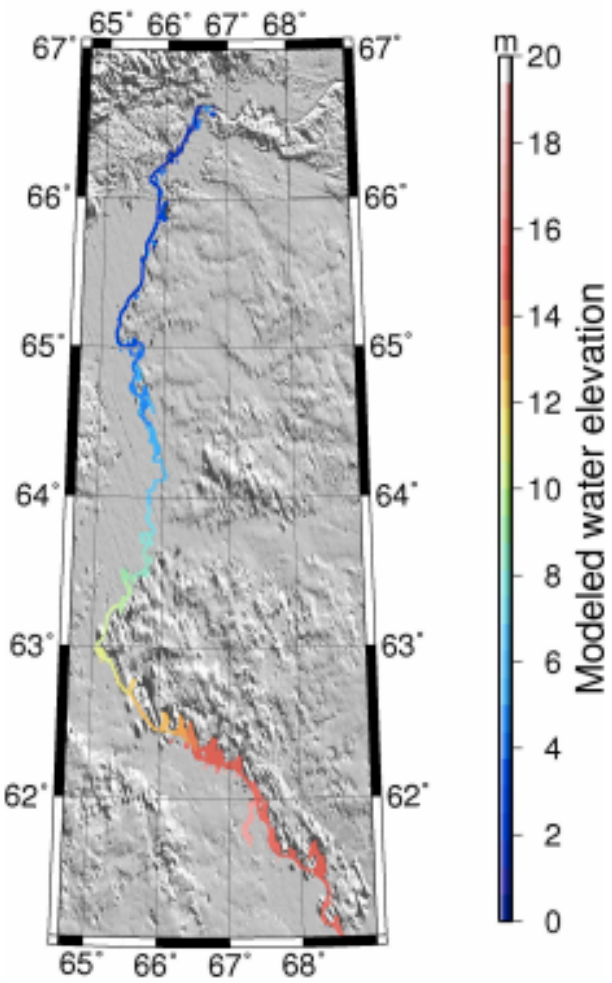
Delwyn Moller and Konstantinos Andreadis

Collaborators: Marc Simard and Tamlin Pavelsky

- A dynamic water mask is a key hydrology data product from SWOT.
- Develop and refine classifications for a variety of sample study regions
  - unique challenges since classification challenges will differ – for example a straight river vs an anastomosing river will present different challenges.
  - Effects of surrounding terrain (eg layover impact, arid versus forested) need to be considered
  - Assess Impact of finite temporal decorrelation for water body delineation

Specific Objectives/Approach

- Refine existing basic “slant-range” classification approach
- Develop a classification construct that uses
  - probabilistic spatio-temporal contiguity constraints
  - hydromorphological classification criteria (e.g. entropy, roughness)
- Utilize models and simulation tools already developed under complementary research efforts
- Run the SWOT Instrument simulator for hydrodynamic models/regions including :
  - Ohio (developed for a THP effort by Co-PI Andreadis)
  - Brahmaputra (courtesy Faisal Hossain)
  - Ob (courtesy Sylvain Biancamaria)
- Refine and assess sensitivities of classification accuracy
  - to temporal correlation of water, foliage cover and backscatter strengths
  - on estimation of river discharge
  - As relevant refine simulator land/water models based on statistics observed from AirSWOT



Example simulation of water levels over the Ob River basin domain (from Biancamaria et al, 2011)

Relevance to Phase-A SWOT Issues

- What is the required spatial resolution?
  - There are a number of factors affecting the spatial resolution, but an important constraint is classification accuracy
  - Will also have implications on 'reach averaging'
- What is the smallest water body that can be sampled from SWOT?
  - Classification will obviously play a role in identifying the smallest resolvable water body
  - Classification will govern how far upstream the river network SWOT can provide direct observations
- Increasing the accuracy of the classification will not only allow a finer resolution but directly affect estimation of river discharge